

tide. It is thus obvious that this tide must be entirely masked by changes of sea-level arising from meteorological causes."

We cannot help thinking that the methods of harmonic analysis described on pp. 157-258 are a little unnecessarily cumbrous. One simplification we should like to suggest. Given the height of the tide at intervals of one solar hour, an approximate period exactly commensurable with a solar hour might always be taken for the tide under analysis. The difference between the true period and the assumed period will then appear as a progressive change of epoch in the successive periods of analysis; meanwhile the assumed period, involving exact repetition after an integral number of hours, immensely facilitates the harmonic analysis, as the present writer has found in an allied subject.

The second part of the volume deals with the lunar disturbance of gravity, and closes with a prediction:—

"I venture to predict that at some future time practical astronomers will no longer be content to eliminate variations of level merely by taking means of results, but will regard corrections derived from a special instrument as necessary to each astronomical observation."

GARDEN BOOKS.

(1) *Roses: Their History, Development and Cultivation.* By Rev. J. H. Pemberton. Pp. xxiv+336. (London: Longmans, Green and Co., 1908.) Price 10s. 6d. net.

(2) *Sir William Temple upon Gardens of Epicurus, with other Seventeenth-Century Garden Essays.* Pp. lxxii+272. (London: Chatto and Windus, 1908.) Price 1s. 6d. net.

(1) **T**HE English literature of the rose ranks higher, and is more abundant, than that of any other florist's flower. By general consent the most popular book on the subject was the late Dean Hole's work, entitled "A Book about Roses," which is read with interest even now for the personal reminiscences it contains. "The Rose Garden," by the late William Paul, is a standard work with invaluable illustrations, and "The Book of the Rose," by the Rev. Foster Melliard, of which a new edition was published shortly before the author's death, is an eloquent expression of the views and ideas of an enthusiast in respect to the qualities of the exhibition rose, and the methods of cultivation by which the plants may be induced to produce the most perfect flowers.

There are many other published works, some newer, others older, than those mentioned, yet such is the interest in the queen of flowers that rose cultivators will gladly welcome the latest contribution by the Rev. J. H. Pemberton.

Rose-growers visit the exhibitions of the National Rose and other societies, and they are induced to emulate the efforts of the best exhibitors. But if ordinary rose-culture is simple enough to those who are willing to give their time and care to the subject,

it is nevertheless true that the production of perfect blooms such as are capable of winning prizes at an important competitive exhibition is attended with all sorts of difficulties. The less experienced growers, therefore, are willing to learn from those who have already achieved success, and certainly no amateur has been more consistently successful over a long period of years than the author of the book under notice.

Mr. Pemberton tells us that his father was an ardent rose-grower, and Mr. Pemberton himself commenced to cultivate roses at the earliest opportunity, being tempted a short time afterwards to enter upon the more adventurous and exciting business of exhibiting his blooms at the competitive exhibitions.

The first portion of the book is devoted to explaining the botanical classification of roses, and to describing some of the more important of the wild species. Some of these are natives of Britain, but the larger number are exotic or foreign.

The author's request in the first chapter that readers will bear in mind that the rose is not an exotic loses much of its point when we remember that the Hybrid Perpetuals, Teas and Hybrid Teas have been obtained entirely from exotic species! These earlier chapters may be recommended to the study of hybridists, for they show clearly that very few species have yet been subjected to cross-breeding, and therefore there are good reasons for the belief that although the present variation in roses is very wide, even greater variation may be expected, and novelties that may establish types altogether distinct from those at present in cultivation.

The author has done well to exhort amateur cultivators to attempt the work of cross-breeding roses for themselves, and notwithstanding that the description given of the processes of fertilisation and fructification is not of scientific exactness, the chapter on raising seedlings will be likely to effect good.

In the second part of the volume Mr. Pemberton talks straight to the cultivator upon the details of cultivation, carefully and thoroughly explaining the systems of vegetative reproduction, such as budding, grafting, layering, and rooting of cuttings; the tilling and manuring of the soil, planting and pruning. In these pages the author's intimate and practical knowledge of his subject is plainly revealed, and the directions are given so lucidly and yet so tersely that to misunderstand them would appear impossible.

As the winner of hundreds of friendly battles Mr. Pemberton is able to afford most valuable hints and directions upon the subject of competitive exhibitions, and whilst his enthusiasm for these will be likely to beget also in his readers a desire to engage in the "Wars of the Roses," his helpful counsel will encourage them to do so with every prospect of obtaining some measure of success.

We are glad that in this book, written as it is by such an enthusiastic exhibitor, the case for the decorative value of roses in the garden is stated so fairly and sympathetically. Not all rose-growers wish to exhibit, but those who do not, equally with those who

do, desire to cultivate the best varieties of roses in the best manner, and the decorative gardener will find much in this book that will specially appeal to him.

The illustrations of rose species are reproductions from authentic works on the subject, and in addition to these there are useful designs which illustrate the practical details of budding, pruning, and other operations. We heartily commend this work to the notice of all who aspire to excel in the art of rose-culture.

(2) This volume is a contribution to the "King's Classics" under the general editorship of Prof. I. Golancz. The first portion, consisting of forty-nine pages, is devoted to an introduction by Mr. Albert Sieveking, who states that the book contains in whole or abstract the Garden Essays of Sir William Temple, Abraham Cowley, Sir Thomas Browne, Andrew Marvell, and John Evelyn, who "in their lives cover the whole of the seventeenth century, and in their writing represent not only some of the best of garden, but of English literature." The introduction is a learned *critique* of the five writers mentioned, and the views contained therein are likely to commend themselves to the reader, for they are well founded, being evidently based on a conscientious study of each. Incidentally Mr. Sieveking gives considerable information upon the history of gardening in Britain, and we commend the reader to study the introduction before reading the selected contributions from the seventeenth-century writers. Of these we regard the prose of Temple as representing a style of literature that is at once pleasing and enlightening. His essay indicates such an appreciation of the art of gardening and intimate knowledge of the best gardens of his day as are certain to appeal to the practical horticulturist.

Notwithstanding our own advanced methods, we are impressed with the insight into cultural problems Temple displays, although some of his opinions were based upon inaccurate premises. His reasons for recommending contemporary gentlemen to possess gardens for themselves are unanswerable, but the lofty air in which they were advanced invests them with a certain amount of humour.

The selection from Cowley includes a letter addressed to Evelyn, and some entertaining verses appreciative of the garden. The extracts from Browne's "Garden of Cyrus" and "Plants Mentioned in Scripture" give the reader some idea of the style of the writer, but they are unsatisfying, and it may be regretted the editor was compelled to curtail them so severely. His observations on grafting prove that numerous experiments were made in this art at that early date. Marvell's verses show an inclination to criticise gardeners for straining after the unnatural and attempting the mixing of plants by purposeful cross-breeding.

Passing to Evelyn's letters to Dr. Browne and others, these are all interesting and informative, whilst the abstracts from his famous "Diary" are not only interesting, but they go to show Evelyn's great knowledge of gardening subjects, and his unusual powers of observation.

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GERMAN SCIENCE MANUALS.

(1) *Bakterien, und ihre Bedeutung im praktischen Leben.* By Dr. H. Mische. Pp. iv+141. (Leipzig: Quelle and Meyer, 1907.)

(2) *Lebensfragen; die Vorgänge des Stoffwechsels.* By Dr. F. B. Ahrens. Pp. vi+153. (Leipzig: Quelle and Meyer, 1907.)

(1) **T**HIS is an excellent little book. In it Dr. Mische expounds the story of the microorganisms so clearly that an ordinary, intelligent reader will easily and pleasantly acquire, so far as mere reading can supply it, a trustworthy knowledge of all the fundamental facts and theories of bacteriology. The author takes us from the *De re rustica* of M. Terentius Varro—who seems to have been in the matter of microbes much what Democritus was in respect to atoms—to the "denkwürdigen Brief" of van Leeuwenhoek to the Royal Society in 1683, wherein the famous observer expresses his naïve astonishment at certain frolicsome "animalcula" he had discovered in the human mouth; and our guide does not leave us until we have seen at least the outstanding features of the work of Jenner, Lister, Pasteur, Koch, Eberth, Winogradsky, and the many others whose labours have, each in its degree, helped to illuminate the dim but fascinating pathways which lead into the realms of the infinitely little. He shows us the microorganisms as helpers and as enemies, their modes of increase, and the methods of their destruction; their distribution on land and sea; and the problems of philosophy and of practical life to which the study of these "little fleas" leads.

The book strikes just the happy mean required in a work of this kind. It avoids the trivialities which often embellish expositions of "popular" science. It states the problems clearly, and discusses them soberly, yet withal is no dull and ponderous disquisition; in style it is rather Gallic than Teutonic.

There is a glossary of such terms as are unusual and not sufficiently explained in the text. Given on the part of the reader a very small modicum of scientific knowledge, no mystery of the microorganism dealt with in the book need remain a mystery for lack of simple and lucid exposition.

(2) The "Lebensfragen" contains a number of articles explaining the principles of nutrition and the origin and method of preparation of the chief food-stuffs. To persons who feel more than a passing curiosity about the production of sugar, butter, beer, wine, tea, and so forth, or about the chemical composition of these substances, the descriptions so far as they go may be recommended as trustworthy. But they do not go far enough for the technical reader, and are not intended for him. In each case a sketch of the source, manufacture, and chief chemical characters of the article is given, together with any salient facts of general or historical interest connected therewith. In the chapter on sugar, there is, for example, a description of how the beet-sugar industry was fostered in France by Napoleon. There are also chapters on enzyme action and on the production and application of artificial fertilisers.